Space Weather Forecast

Issued on Tuesday, 08 March 2022 at 12:45 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Slight Chance of G1 Minor Geomagnetic Storms, peaking to end current working week. Daily Chance of R1 Minor Radio Blackouts.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was low over the period, with activity confined to occasional low common-class X-ray flares. The peak events of the period were both attributable to a bright region near or possibly just over the northeastern solar horizon, likely implying that there is a sunspot at this location - to be confirmed in forthcoming imagery. The sun was otherwise populated by up to six sunspot groups. Of these, a long-term resident in the southeast dominated in terms of magnetic complexity and area, showing slight intermediate spot proliferation and areal increase, with these trends implying an increase in activity is possible. Also of note was a newly-developed bipolar region in the southwest, having emerged from an insignificant area 24 hours ago. Remaining spots on the sun were less significant, mostly suffering a decrease in spot count and area as well as latitudinal spreading, which are indicators of falling flare risk in these groups.

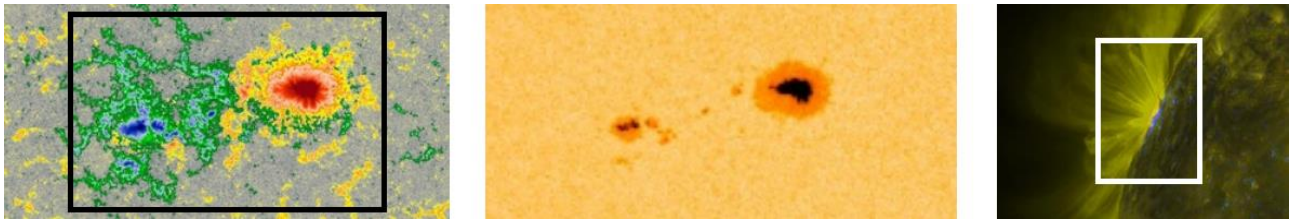

Figure 1: Magnetic and visible imagery of the current largest front-side sunspot group, with the right image showing a possible new region on the northeastern solar horizon boxed in white, with magentic flux emanating from this shown as yellow streamers.

There were two main events visible on satellite imagery in the 24 hours: firstly a large 'prominence eruption' from the southeastern horizon of the sun around 07/1400UTC; and secondly a large 'filament eruption' from the northwest around 08/0400UTC. Both are attributable to arcs of plasma that can become Coronal Mass Ejections (CMEs) if ejected forcefully enough. The former has been analysed and found to be comfortably behind the Earth in the track of its orbit to no effect. The latter is pending assessment, but is provisionally more likely to carry at least some form of Earth-bound component for being more central. Updates will follow regarding this final aspect. The sun is otherwise populated with numerous sunspot regions and filaments at present, and there is ongoing risk of further similar emissions.

Solar Wind / Geomagnetic Activity: The solar wind was characteristic of a waning connection to a 'coronal hole' fast wind. The solar wind speed showed a somewhat erratic tendency but fell overall in the 24 hours. The number of particles comprising this solar wind was variable within normal background levels, while the associated magnetic field was unremarkable. The north-south component of this field was initially mostly anti-aligned with Earth's field at first, but became more neutral with time.

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The net result of the above solar wind measures was provisionally increasingly quiet Kp indices - well below Minor Storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be low, with further occasional common-class flares and a daily chance of moderate-class activity, with the current largest spot the main culprit.

Solar Wind / Geomagnetic Activity: There are currently two low confidence CMEs in the forecast and a third undergoing analysis. This part of the forecast is considered with the current waning 'coronal hole' fast solar wind. All considered, the effects of both the persistent and transient solar wind should give initial quiet conditions, followed by an increasing chance of Minor Storm G1 after midweek, peaking at a daily slight chance before waning before the UTC weekend.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, however there is a very slight and increasing daily risk of S1 from the usual 13 degree-per-day westward advance of the more complex spots on the sun.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	5	20	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	25	25	25	25
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	2	2	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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